Amendments to the Drawings

Please amend Fig. 23 of the drawings to show the concave upper surface of the coupling element 11 shown correctly in original Fig. 3 but incorrectly shown in original Fig. 23. A marked-up copy of original Fig. 23 and a replacement sheet containing amended Fig. 23 and original Figs. 21, 22 and 24 are enclosed.

REMARKS

By the foregoing amendment the specification has been amended on page 1 to update the status of the related applications and claims 1, 12, 30, 31 and 40 have been amended. Claims 1-49 remain in the application with claims 20-29 and 47-49 being withdrawn from consideration as being drawn to non-elected species.

Figure 23 of the drawings has also been amended to properly show the concave upper surface of the coupling element, consistent with the coupling element as shown in original Figure 3. A new sheet of drawings containing the amended Figure 23 is enclosed along with a marked-up copy of original Fig. 23 showing the changes made. No new matter has been added.

The disclosure was objected to in the outstanding Office Action because the cross-reference to related application section of the specification needed to be updated. This was done by the amendments to the specification as mentioned above.

Claims 1-49 are provisionally rejected in the Office Action under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims in each of the commonly owned, co-pending application numbers 10/473,682; 10/594,796; 11/234,159 and 11/643,676, as stated on page 3 of the Office Action. Responsive to the provisional rejection, enclosed herewith is a Terminal Disclaimer disclaiming the term of any patent issuing from the present application which would extend beyond the full statutory term of any patent issuing from application numbers 10/473,682 and 10/594,796. It is requested that the rejection be withdrawn with respect to

serial numbers 11/234,159 and 11/643,676 as these are later filed applications, MPEP 1490 D.

Application claims are rejected in the outstanding Office Action under 35 U.S.C. §102(b) as being anticipated by each of E.C. Carter, U.S. 2,453,969; GOEMED ORTHOPAEDIE SERVICE DE 299 40 434 U1; Martin FR 2,734,151; Fikes U.S. 4,911,724 and Atkinson, et al., U.S. PG Pub. No. 2002/0087216 A1 as stated on pages 4-15 of the Office Action. These rejections are hereby traversed and reconsideration thereof is respectfully requested in view of the above amendments to the claims and Applicants remarks set forth below.

The present invention is directed to an improved prosthetic foot and method of generating kinetic power for propulsive force in a lower extremity prosthesis which offer a higher performance, dynamic response characteristic compared with conventional prostheses as discussed in the application specification. The method as recited in claim1 as amended comprises providing a monolithically formed resilient member which forms the ankle and the shank in the prosthesis with the lower end of the resilient member terminating posteriorly and anteriorly extending upwardly by way of an anterior facing convexly curved surface to form the ankle, the resilient member extending upwardly substantially above human ankle joint height and the ankle to form the shank, wherein the resilient member is curved longitudinally over at least substantially the entire height of the member above the foot; and assisting posterior movement of the upper end of the resilient member and controlling anterior movement of the upper end of the resilient member during use of the prosthesis.

The ability of the method and prosthetic foot to provide improved dynamic response is discussed with respect to Figs. 1 and 2 of the application drawings. Both the ankle and the elongated, upstanding shank above the ankle are curved longitudinally for exploiting the differential energy storing and returning capabilities of the structure in compression and expansion during gait where expansion of the curved structure is resisted to a greater extent than compression. Further, as shown for example in the prosthetic foot of the elected species in Figure 41, the prosthetic foot includes a device, 125, connected to an upper portion of the calf shank and the lower portion of the prosthetic foot to assist posterior movement of the upper end of the shank and to control anterior movement of the upper end of the calf shank. Together, this combination of method steps and structural features of the invention are effective to change the ankle torque ratio of the prosthetic foot in gait to mimic that which occurs in the human foot in gait as stated on page 27 of the specification. The prosthetic foot and method of the invention as recited in the claims as amended are not anticipated by the cited references.

E.C. Carter U.S. 2,453,969 discloses an artificial limb having only a horizontally extending u-shaped coil spring structure forming an ankle between a foot and a rigid calf portion 1. Motion is essentially up and down in the ankle. Carter does not have a resilient, upstanding calf shank which is curved longitudinally over at least substantially the entire height of the calf shank above the foot keel. The artificial limb of Carter suffers from the disadvantages of the approximately c-shaped insert/ankle of Martin, et al. U.S. 5,897,594 as discussed in the background art section of the specification.

A translation of portions of GOMED is attached as Exhibit A. As seen from the translation, GOMED discloses a prosthetic foot for connection to an artificial leg. The foot uses a rear e-shaped spiral spring connected at the lower portion to front foot spring 3 with its upper free end 8 (at the top of the rear e-shape) being bent inward for connection with lower portion 16 of connector 4 for connection to the artificial leg. The rear e-shape spiral spring of GOMED does not have a height which extends substantially above human ankle joint height or define a lower prosthetic part of a leg. The rear e-shape spiral spring 5 of GOMED, like the c-shaped ankle of the prior art, provides essentially vertical spring motion in use. It does not provide means for sagital, anterior dorsiflexion and posterior plantarflexion motion in response to a ground reaction force created in a person's gait in the prosthetic foot as is the case in Applicants prosthetic foot with the shank which extends substantially upward above human ankle joint height and the ankle.

Martin FR 2734151 discloses only an ankle armature 20 having a c-shape similar to the reactive element of Martin, et al., U.S. 5,897,594 referred to above and in the background art section of the specification. Martin does not provide for an elongated, upstanding shank above the ankle as recited in Applicants claims. An English translation of Martin is attached as Exhibit B.

Fikes, U.S. 4,911,724, discloses an energy responsive prosthetic leg in the form of an L-shaped member, 11 in Figures 1 and 2, 20 in Figure 2A. The L-shaped member has a flat, elliptical base member 12 as the lower end of the member by which the member is joined to an artificial foot by a pin member, 36 in Figures 1 and 4. An ankle portion, 22 in Figure 2, 22' in Figure 2A, at the lower end of the L-shaped member forms an anteriorly facing acute

angle or concavity with the base member. According to Fikes at column 4, lines 4-8, the acute angle formed between the lower portion of the vertical member 14, 24' and the elliptical base member 12 provides for an active source of energy in the ankle portion 22 of the L-shaped member 11, 20 during the walking cycle. However, in this regard Applicants note that with a prosthetic leg of Fikes in plantarflexion upon heel contact in gait the acute angle of the ankle portion 22/22' tends to be expanded and in dorsiflexion in the late mid-stance phase of gait the acute angle tends to be compressed. The opposite is true in the prosthetic foot and method of the present invention wherein the ankle joint area is anterior facing convexly curved such that it is compressed in plantarflexion and expanded in dorsiflexion. Expansion is resisted more than compression as discussed in Applicants specification for advantageously storing higher amounts of energy in the late mid-stance phase of gait, the stored energy adding to the propulsion of the amputee's body's center of gravity as noted on page 18 of the specification. By increasing the active length of the calf shank with expansion of the ankle joint area at the lower end of the calf shank in dorsiflexion, in accordance with the invention the dynamic response capabilities of the calf shank are increased at the time energy storage and release are most needed. Thus, Applicants prosthetic foot and method of improving a dynamic response of a prosthetic foot in gait are different structurally and functionally from the prosthetic leg of Fikes.

Atkinson et al. disclose a prosthetic walking system which teaches away from the present invention by the use of a straight pylon or shank connected to a generally c-shaped ankle. With respect to the disclosure in

Figures 9-13, 19 and 20, the disclosed prosthetic walking system 250 in Figures 9A-9D comprises an integral, straight pylon 252 and a prosthetic ankle assembly 210. The pylon 252 preferably has a substantially circular cross section 280 and is joined to the prosthetic ankle 212 at an upper leg 214 of the ankle. The upper leg 214 of the ankle and the lower leg 224 are joined by an interconnecting portion 232. Atkinson et al. state at the top of the left column on page 10 that the prosthetic walking system 250 preferably flexes at the interconnecting portion 232 of the prosthetic ankle 212, rather than at the straight pylon 252. Atkinson, et al. do not teach or suggest exploiting the shank above the ankle with the use of a structure curved longitudinally over at least substantially the entire height of the member above the foot for storing and releasing energy to improve dynamic response in the prosthetic foot in gait as recited in the claims as amended. The u-shaped ankle of Atkinson et al. with rigid legs and flexible connecting portion, with the straight pylon being connected to the upper rigid leg, does not obtain the improved dynamic response provided by the prosthesis and method of the present invention as recited in the claims as amended. The reference actually teaches away from the present invention as claimed.

In view of the above amendments and remarks, it is respectfully submitted that the claims as amended clearly patentably define over the cited references. Accordingly, reconsideration and allowance of the amended claims is requested.

Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 01-

2135 (Case No. 183.39735PA6) and please credit any excess fees to such deposit account.

Respectfully submitted,

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Attachments